





MOTTO: "THE LIGHT OF SCIENCE."

PRESENTED BY THE AUTHOR.

*to the Royal College of Physicians, Scotland,  
through the President.*

**PART I.—CHOLERA; ITS CURE—**

based on the chemistry of the human body, and confirmed by  
medical science and practice, during forty years of  
residence in India, Ceylon, the Indo-Chinese  
and Malay Peninsulas, Borneo and  
Java;—submitted for the

**"PRIX BREANT."**

to the Academy of Sciences, Paris;

BY

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[NOTIFICATION.—This first part is printed after the second, or  
"Sequel, on Scarlet Fever," for reasons, one of which is that the  
sequel is necessary to the easier comprehending of this first part. A  
second careful perusal of this first part with the added light cast upon  
it by the Sequel, therefore, is recommended after the first or preliminary  
study of the two.

These two parts are only instalments of my great work, and  
I am thankful to say that I am not without hope of being able to  
finish it. I have devoted the remainder of my life to it, if the Great,  
Good, All-Wise Spirit of the Universe permits. The "physician" is  
specially created by Him; and all knowledge, skill, and learning,  
come specially from Him.

To the end of completing my life-work, and freeing humanity  
from being ridden by ignorance and disease, I would not again decline  
an offer from a Royal Court in Europe as I have done before. A  
private position, and private limited means, are not conducive to, or  
able for, such a great thing as I find to my cost and that of my family.  
A call or offer, therefore, such as I received in 1873 from one of the  
richest Royal Courts in Europe, from any Royal or Imperial Court,  
would not be declined now. I wish to be the Superintendent or  
Director of Scientific Investigations of Human Diseases, such as M.  
Pasteur is in Paris in the domain of the lower animals. It becomes  
Royalty everywhere to move in every good, true, and right thing. I  
have every confidence that my wish and desire shall be gratified.

The quotations from Scripture and my following remark, on the  
title page of the Sequel, have been misunderstood by both theologians  
and scientists. Owning as I do the friendship and esteem of some of  
the most eminent of these in England and on the Continent of Europe,  
I feel it incumbent on me to explain my position. I shall do so to  
their entire satisfaction when I have more leisure.

As stated in the second part, or the Sequel, there will be found  
*lacunæ* in my writings for the unlearned. I write only for masters.  
I have not time for others, although they are quite as numerous in the  
medical as in other professions.

My work on the "Chemical and Scientific Elucidation of the Great Epidemic Diseases" will mark the beginning of a new era in medicine, and will live a thousand years hence as the groundwork and basis of all scientific and true medical knowledge and practice. Nothing that is of any real value of the present age of *empiricism* will be lost in the new, but taken up in it.

To fill up the *lacunæ* will furnish interesting study to masters of medical chemistry and scientific practitioners.

Let me note here that there is no one who is more acquainted with the subjects on which I write, and on which I offer triple—logical, mathematical, and scientific—demonstration, with the "proof" of it added; and let no one vainly imagine either that my prescribed rigid procedure, science, or knowledge, is wanting, or wrong. Everything has been duly and fully considered, much more than any one looking at the mere surface can imagine. A questioner here will only show his great ignorance. I want *learners*, and not questioners who do not know the extent of their ignorance. Hence it is I write only for masters; for such alone will be *learners*; and such alone, by diligent study and perfect knowledge, will be able to grasp the facts and trains of thought expositied by me. Yet honest questions I am willing to take a note of.]

### Prefatory Remarks.

Medical science logically and rationally consists in the study of the chemical action and changes set up in the human body by abnormal conditions:—the study of their phenomena, causes, and remedies. Else it is empiricism, which may be useful, but is illogical and irrational. Such, however, unfortunately is the most part of the so-called medical science even of the present day. It is a disgrace alike to science and to the age.

There is no remedy which is either a *panacea*—a universal cure, or which must and shall infallibly cure in every case of any particular disease, even if its action on the disease is as clear as noonday, and as certain as the mathematics and physics of chemistry. There are too many independent elements which come in between its action in every individual case, and weaken, complicate, nullify, or affect it in some degree. In applying, therefore, even sure remedies, *all* these *independent* elements have to be taken into account. And further, these elements cannot be calculated with mathematical exactitude. Very large and extended and close and precise and continuous study, observation, and practice, only can enable the scientific practitioner to make but an approximation of each of them, which may suffice for very successful practice, but which will not obviate error. It has also been statistically computed that there is an average of two *p. c.* of error in the most perfect of human works. To err, therefore, and indeed, is human. Science alone and by itself is true, and without error. Its calculations are certain; its arms all-embracing; its depths unfathomable;—science is truth absolute.

Specially in Cholera are there all these independent elements, and also chances of error. Here several poisonous abnormal conditions, with varying forces, disturb the balance of the powers and the intimate correlation of all the parts and organs of the human body to each other, and the disturbance is in proportion to the forces of the varying abnormal conditions, and numerous physical and other considerations relating to the patient. And further; these varying poisonous



abnormal conditions are accompanied or illustrated by the liquefaction of the blood and destruction of the red corpuscles, which sets up its own element of evil and danger.

In the investigation of Cholera, therefore, or indeed of any disease, it is sufficient if we conduct our research on acknowledged scientific principles. Chemical science as applied to, and in, the human body will indicate to us the cure. This must be confirmed by practice. If any particular results in practice fail, we are to examine into the causes of the failure, which may be many. We are not to reject the true for our own defective observation of it, and erroneous application to it of its remedies. Where there are so many independent elements of calculation, and sources of error, and all as applied to getting a result of fine narrowed accuracy, which the equilibrium of the forces of the healthy vital process represents, it hardly needs to be a mathematician to understand that the resulting confirmation may be wanting to any one individual heedless, or even observant and scientific, practitioner. But truth is truth, and will be generally seen and acknowledged. I here show the conditions of cholera and its cure. The direction, and ordering of its indicated cure is left to the practice of scientific professors of medicine. The abnormal conditions being known, with the chemical results and action set up thereon, the estimation of all the independent elements helping to establish those abnormal conditions, with the degree to which the chemical results have proceeded, will be needed for the application of the indicated remedies, which again are to be proportioned to the state of the original abnormal conditions, and the degree of the chemical results, and the strength, powers, history, &c., of the patient. If any particular is not understood, or appears to want confirmation, it should be seen if the erroneous comprehension, and imperfect estimation, of the whole very large subject, and defective direction of the cure, should not be charged with it.

To repeat our previous remark ;— no one in the present enlightened and scientific age expects a remedy which, as an infallible dose, even if possessing all due fitness, shall, will, and must, and only can, cure, like magic or a charm, in every case of a particular disease. To expect such would be to betray a considerable amount of ignorance. It was not for such a charm of magical powers, inconsistent with science, physiology, and the pathology of diseased conditions, that the prize has been offered through the most learned scientific body in the world. What is now here wanted is a cure ; and a cure is a cure and cannot be mistaken.

Cholera—its conditions of origination, growth, and phenomena, including blood and other complications, and the agents which apply to their cure, are all what may be scientifically ascertained ; and practice, and the symptoms, pathology, and morbid anatomy, be made to illustrate and prove them. This is what is legitimately required on the subject. It will be seen that I meet and explain all the chemical phenomena, the symptoms, the morbid anatomy, and every form of successful empiric treatment of the disease. The subject largely affects the well-being of humanity, the economics of states, and even the status of science ; and I submit this paper to the world of enlightened and advanced medical science with confidence, and have no hesitation of the result. What I state is scientific truth, with universal confirmation.

### Cholera ; Its Cure.

I. In the action of cholera, an abnormal and destructive condition is induced by internal and external causes. An action also is set up in the blood tending to its liquefaction and destruction of the red corpuscles. This action may be general.

The symptoms, effects, and morbid anatomy, of the disease are well known.

I shall first note down a few very elementary chemical and physiological observations.

Man absorbs oxygen, and in the process of respiration evolves carbon dioxide  $\text{CO}_2$ . Together with this gas volatile putrescible matters are exhaled from the skin and lungs. These matters act prejudicially on the health. The gas, too, is poisonous and destructive.  $\text{CO}_2$  consists of carbon 27.27 and oxygen 72.73, the volume of  $\text{CO}_2$  formed being equal to that of the oxygen used in its formation.

After the lacteals have taken up the fluid portion chyme mixed with bile, the chyle proceeds to the thoracic duct and with the lymph is poured into the *vena cava*, mixes with the venous blood, takes up oxygen, becomes arterial, and is sent forward to all parts, the oxygen being yielded to the effete tissues to oxidise them, while the  $\text{CO}_2$  evolved is conveyed back to the lungs and given off by diffusion. By this oxidation the heat of the body is sustained, the combustion taking place in the capillaries, which receive the oxygen carried to them in the arterial blood, and then transmit through the veins the  $\text{CO}_2$  evolved to be passed off by the lungs at the same time that a fresh supply of oxygen is taken up. Thus, there is a constant discharge of poison and waste and accession of life-renewing oxygen.

All this implies the previous action of normal bile on normal chyme, and the due and sufficient action of the oxygen on the normal chyle or nutriment presented to it. That is, the normal nutriment must be present, and the normal quantity of oxygen, and the latter must act on the former. Here, then, are three elements, the nutriment, the oxygen, and the contact. If the nutriment be abnormal, or there be less oxygen, or both don't come to the normal standard of contact, that which has to be thrown off as poisonous waste is retained in the constitution, and to its degree disorganises the functions of the kidneys, the lungs, and the skin, and affects the blood, the spleen, and every other organ, portion, and function of the human body.

Of the three elements above-noted, if the nutriment alone be abnormal, while there is a sufficiency of oxygen, and the two have the contact that is necessary, the poison may be worked out. If the nutriment be normal, and there is a sufficiency of contact, but insufficient oxygen, the result may also be made favorable. If the nutriment is normal, and the oxygen is sufficient, there is deficient contact, the constitution may be helped to get over the difficulty.

That is, if we represent the three elements of nutriment, oxygen, and contact, respectively by the letters N, O, and C. and assign positive and negative values for their being normal or abnormal, the positive for the normal, and the negative for the abnormal, we may represent the subject symbolically thus:—

$$\begin{array}{l} \text{plus N plus C} > - \text{N, or } - \text{N} < \text{plus N plus C} \\ \text{plus N plus C} > - \text{O, or } - \text{O} < \text{plus N plus C} \\ \text{plus O plus N} > - \text{C, or } - \text{C} < \text{plus O plus N} \end{array}$$

These may be regarded as the standard of safety.



Again ;— (O plus C) > plus N, or plus N < — (O plus C)  
 — (N plus C) > plus O, or plus O < — (N plus C)  
 — (O plus N) > plus C, or plus C < — (O plus N)

These may be regarded as the standard of danger. That is, normal nutriment sinks in the scale when put against insufficient oxygen and insufficient contact; and insufficient oxygen is outweighed by abnormal nutriment and deficient contact; while a normal contact can be of little efficacy as against a combined deficient standard of nutriment and oxygen.

Again, using the same symbols :—

plus N plus O > or < plus N plus C  
 plus N plus C > or < plus O plus C  
 plus N plus O > or < plus O plus C; and *vice versa*.

Here the forces stand equalised.

All which may be summarised thus ;—

- (1) plus N plus O plus C ;—the normal balance and standard of health.
  - (2) — N plus O plus C
  - (3) — O plus N plus C
  - (4) — C plus N plus O
  - (5) — N — O plus C
  - (6) — N plus O — C
  - (7) — C — O plus N
  - (8) — C — O — N ; *death*.
- ;—recovery probable.  
 ; recovery difficult.

To each of from (2) to (7) have to be added or subtracted personal and other elements; and each of the three elements N, O, C, has varying degrees affecting and varying the result.

II. Let us now return to our chemical and physiological observations.

All substances present in any part each maintain a certain proportion and each perform a special part, to the requisite performance of which part the proportion is necessary and cannot be disturbed.

Of 1000 parts of blood, there are nearly 790 parts water and nearly 11 parts salts and fatty matter. This is the limit of dilution within which the red corpuscles retain their integrity, for when water is added they immediately become attacked. These red corpuscles, so easily dissolved by water, remain uninjured in the fluid portion of the blood owing to the presence of saline matter. The globules float in a saline liquid in which there is equilibrium between the contents of the globules and the fluid surrounding them. Salt contracts. The corpuscles are insoluble in a strong solution of chloride of sodium.

The blood is invariably alkaline, containing the common phosphate of soda  $\text{PO}_5 \begin{Bmatrix} 2\text{NaO} \\ \text{HO} \end{Bmatrix}$ , a salt which is always formed when the phosphoric acid of *juice of flesh* acts on the chloride of sodium or salts of soda, and which is strongly alkaline.

The change from dark venous to florid arterial blood depends on the presence of oxygen, but also requires the presence of a saline solution. A similar change of colour may be seen taking place *in vacuo* if the clot of venous blood be there covered with a pretty strong solution of various salts.

Soda is as essential to blood, as potash to the *juice of flesh*. Excess of alkali is required to form the blood, to enable it to perform its functions, to promote the oxidation of effete matter. The blood must be alkaline in order to perform its functions, and it is rendered alkaline either by carbonate of soda or by phosphate of soda or by both. Two salts so different in composition as carbonate of soda  $\text{NaO}$ ,

CO<sub>2</sub>, and phosphate of soda 2NaO, HO, PO<sub>5</sub>, yet closely agree in being alkaline.

In cholera the proper salts of the serum may fall to *one half*, and thus affect the integrity of the red corpuscles. The blood becomes thick and dark in cholera. There is both destruction of the corpuscles and defective oxygenation; there being also transudation of water.

Diet affects the urine in *soluble* salts which are the same as those of the blood; and diet can also modify them in the blood.

III. The bile is always present in the blood in a small proportion. The bile is separated from the blood by the liver, and collected in the gall-bladder. When incinerated, among other residuums there is chloride of sodium. The bile is a mixture, in a certain proportion, of two salts, of which the base is soda. Soda is the essential basic element of the bile. The basic element,—the soda is found also in the chyle and in the blood,—and the free muriatic acid always present in the chyme before it leaves the stomach, are both derived from the salt which is either originally present in the food, or is added to it by man.

All food capable of sustaining life must contain mineral salts. These are common salt, alkaline and earthy phosphates, &c. Animals cannot form blood or bile unless their food contain, along with the phosphates, salts of soda, or at least, chloride of sodium. Herbivorous animals which produce an enormous quantity of bile find salt—which is a chief source of sodium or soda for the blood and bile—in their food and drink, and show the greatest preference for salt springs, and for solid salt placed within their reach. When they are fed on the land plants of soils in which sodium is deficient, common salt must be given to them. Animals instinctively take it, and even search for it; nature has made the largest provision of it for all animals including man—even the very breezes blowing over wide oceans are made to carry salt; and its effects on their general health and all their secretions are most marked. Salt generally promotes the secretions. The absence of salt deranges the whole vital process, and particularly the secretion of bile, which requires soda, that is, oxide of sodium. Salt however acts as salt. Salt maintains the normal condition of the fluid portions and elements of the human body. <sup>1</sup>

Lymph has 2 p. c. of salts.

Soda, chiefly as chloride of sodium, is formed also in the *juice of flesh*.

IV. The change from dark venous blood carrying poisonous waste to florid arterial blood depends on the presence of oxygen as well as a saline solution. <sup>2</sup>

The oxidation of carbon and hydrogen carries on the vital chemical changes—evolves the CO<sub>2</sub> by the venous blood and secretes water by the lungs, skin, and kidneys—and also yields the animal heat which is generated everywhere, chiefly in the capillaries. This oxidation is constantly going on—every breath of oxygen maintains it, all the

<sup>1</sup> Seventeen years ago I made a representation to the Government of India to reduce the tax on salt which fell very heavily on the poorest natives, and there was some reduction made; and yet, on this *free gift of nature so essential to the life and health and well-being of man*, that Government still annually raises some ten million of pounds sterling of revenue from taxation of salt alone (!) from the poorest natives imaginable. But what are millions of lives and cholera epidemics to millions of revenue? Salt ought to be free; as free as oxygen and air. Whoever denies it to the poor, ought himself to be deprived of it.

<sup>2</sup> Arterial blood contains about twice as much oxygen and a third less carbonic acid than venous blood.



tissues and organs and parts are brought under its operation, and all the excretory and secretory organs are kept employed by it. <sup>3</sup>

The characteristic feature of the changes in the animal body when oxygen comes into operation is that the changes strike deeper than when water alone is added, and we obtain the constituents of bile and of urine, as well as CO<sub>2</sub> to be excreted by the lungs. For the formation of albumen, gelatine, and chondrine, the chief materials of the tissues, water alone suffices. The acids, too, of bile are products of the destruction of sanguigenous matter by the oxygen of the blood. Lactic acid, which is present in large quantity in the *juice of flesh*, needs oxygen to consume it. Glucose transformed into lactic acid—which combines with the soda of the blood—needs oxygen to be oxidised and burnt off in the blood. The insoluble uric acid needs oxygen to convert it into soluble products which may pass out. In cholera the urine is stopped. According to Voit there are 2.43 *grammes* of urea in 1,000 parts of blood of a cholera patient. According to Chaluët 3.60 *grammes* in 1,000 parts. [*Gautier: Chimie Appliquée, vol. ii. p.337.*] At the same time salt also is necessary to promote the oxidation of effete matter in the blood. Where there is a deficiency of it we have the uric acid diathesis,—the oxalic acid diathesis being promoted by a little more oxygen but also deficiency of alkali.

Where oxygen is deficient, combustible matter accumulates in the blood beyond due proportion; at the same time the liver is called on to work beyond its powers in secreting bile or forming fat.

The products of the waste tissues are sent out of the body by the lungs, the skin, the kidneys, and the intestines, and the occurrence of an impediment in any of these, calls into increased action the others, an action that may injure them.

V. We have seen in detail CO<sub>2</sub>, blood, bile, other fluids, &c., oxygen, and salt in relation to them all, as they have an internal bearing on Cholera. Let us now see some of them, bearing on cholera externally.

Cholera, as a rule, prevails in summer, or under certain conditions of the atmosphere, when there is less oxygen in the air to carry off the oxidised products in the blood. At the same time, owing to the presence of fruits, &c., in excess, the nutriment is affected and the bile disordered.

During a former visitation of cholera in the West, a great fire in a city—which increased the currents of fresh air and of oxygen—was marked by the subsequent cessation of the disease which was raging there at the time. Similarly, only last year (1882) in Manilla cholera was raging when the occurrence of a violent hurricane put a sudden end to the visitation.

The track and course of (Asiatic) cholera has been marked by a diminution of ozone in the air. Ozone is formed when oxygen is charged with electricity. The less electricity the less ozone; the less oxygen the less ozone; the less oxygen the less respiration; the less respiration the less oxygen taken in; the less respiration the less

<sup>3</sup> The lungs and skin excrete carbon, with oxygen, as carbonic acid; the kidneys, with nitrogen and oxygen and hydrogen, as urea and uric acid; and the liver, with oxygen, hydrogen, and nitrogen, as cholic and glycocholic acids.

Of 3,950 *grammes* of regulated food and drink Vierordt gives water 2318, oxygen 782 (from air 744 and food 38), carbon 282. Thus, the oxygen is about a fifth part by weight of all the solids and liquids taken as food; and twice as great as all the rest not water. But what if while the oxygen is less, the carbon is also greatly in excess?

CO<sub>2</sub>, &c., exhaled, and the more poisonous matter retained, with consequences to the blood, bile, tissues, &c.

Here, then, we come back to our symbols N. O. C. Abnormal conditions induced internally in abnormal nutriment<sup>4</sup> with general alkaline deficiency = — N. Here are the milder forms of cholera including all preliminary symptoms.<sup>5</sup> This minus N is presented to the O at seasons or circumstances—as in overcrowding, Hindoo and Mahomedan pilgrimages, &c.,—when it is abnormally, that is, is — O. What, then, can be the value of any contact C, when the very elements presented for the contact are in an abnormal condition? The combination of the negative values of the three is death. Of two, Asiatic Cholera. The results vary according to combinations and personal and other elements; and include between health and decease all possible and numerous gradations according to the degree of each of the three, and the other elements. Thus, there is an infinite diversity from the strong and healthy man suddenly carried off in three or four hours, with hardly any evacuation, to the weak, asthmatic patient who struggles easily through an attack for three or four days and comes out recovered at the end. Symptoms, and treatment, are therefore, as diversified, and appropriate.

VI. I might stop here, for I am not writing for tyros, but masters and teachers.<sup>6</sup> But a few notes on symptoms, and treatment, may be acceptable.

We have seen the presence of chloride of sodium in the blood, the blood's alkalinity, the integrity of the red corpuscles preserved by it, its necessity to enable the blood to carry on the vital functions, its presence and need elsewhere even in the bile and lymph, and the equilibrium of forces—in other words, normal vital electricity—maintained (in conjunction) by it; and we have seen that it may fall even to *one half* in the serum of the blood of a cholera patient. The blood and bile, &c., are ready to do their duty and maintain the vital process if they have enough of oxygen and soda. It is this oxygen and salt we have to supply the body with. Of course, all the symptoms have to be considered; but these strike at the root of the disease. Chemistry, physiology, pathology, symptoms, morbid anatomy, all indicate them, and all practice confirms them. The vomiting and purging of cholera is an effort of nature to get rid of the poisons working within, and so re-establish normal conditions. Mild cholera is distinguished from Asiatic cholera by the purging of bilious fœculent matter. In Asiatic cholera the matter ejected from the stomach and bowels is free from bile and colourless. We see the comparative im-

<sup>4</sup> In connection with this abnormal nutriment, and what it may effect by itself, without other elements of evil, we note that the bile, by its alkalinity, aids the pancreatic fluid in neutralising the acid chyme, and precipitating any imperfectly digested albumin (parapeptone.) But in cholera of 1000 parts of serum, 133 parts of albumin have been found, whereas the normal average is about 70.

Nitrogen is an essential constituent of the proximate principle of albumin, but does not support combustion and destroys life from the want of oxygen.

Again; mal-assimilation of the albuminous constituents results in the formation of uric acid; and a tendency to mal-assimilation is given by habitual excess in the use of the several constituents of the food which predominates in those taken with cholera.

The blood is freed from its carbon almost entirely by the lungs, and the large quantity of this carbon is known. But what if it be greatly increased, and there is also, *proportionally less salt, increase of acid, &c., and less oxygen?*

Excess of acid in the blood is a disturbance of the vital process. The blood becomes black by contact with acids. The blood is dark and "tarry" in cholera.

<sup>5</sup> See note (7) following.

<sup>6</sup> Even to these it is possible the proof may not be clear at first. I would recommend such to read the SEQUEL; and then re-peruse this carefully. A thorough knowledge of medical chemistry is requisite, as well as of the diseases themselves.



munity of danger of the former, as the poisons are evacuated; in accordance, too, with the symbolic *formulae* (See I and V.) Hence the general success of the castor oil cure in this form. In the latter Asiatic form, the abnormal conditions are so much more aggravated, or more effective, owing to a number of causes, that the secreting and excreting organs are much disorganised, and disfunctioned; the liver is gorged; the fluid exuded through the mucous membrane of the alimentary canal a token of the general dilution of the fluids, an evidence of the dire contest raging between life and death in the blood, and the desperate effort of nature to maintain the red corpuscles even if by that way—the loss of the vital electric condition, heat, &c. In extreme cases there can be no evacuation at all. As soon as bile re-appears in the motions, a favourable condition is begun. In the pathology and morbid anatomy we find the spleen, a blood gland, bloodless and collapsed. The kidneys are congested. The lungs are congested, or otherwise severely affected. The liver and gall-bladder gorged with bile. The veins and arteries all alike loaded with thick dark blood. The red corpuscles perished. Urea in the blood. The urinary bladder contracted and empty. All the organs, and all the blood, the vital fluid, have everywhere been engaged in the terrible struggle, the fight between life and death! All the fluids of the body have wanted consistency. The water of the blood has been poured out in a fruitless effort to save the corpuscles. The organs have been required to do others' duties when they were hardly able to meet their own engagements, and all have been placed *hors de combat*. Externally there was collapse. Respiration fell below the average, and was difficult. There was little oxidation, the vital process was stopped, and the temperature may have fallen down to even  $72^{\circ} F$ .

VII. In the treatment, supply the oxygen or fresh air, as much of it as possible. Maintain the integrity of the red corpuscles, and restrain the outflow of all the fluids by chloride of sodium. These are always sufficient for premonitory symptoms<sup>7</sup>; and are also indicated afterwards. Injections also of solution of salt into the veins effect prompt and marked relief of all the symptoms in the worse stages.<sup>8</sup> The lungs ought to be brought into free play, in increased, or fresh, oxygen. Diffusible stimulants as camphor, and oil of pip. menth., and cayenne, to meet the nervous depression, and opium for a stimulant as well to counteract pain. Of astringents acetate of lead, in very moderate doses. Champagne as a drink, as cold as possible—iced. And external warmth and comfort.

We supply the oxygen to ærate the blood and evolve  $CO_2$ , &c.; chloride of sodium to save the blood and fluids, and also work with the oxygen in recovering the vital process; the generation of sulphurous acid  $SO_2$ , or a weak solution of it—which absorbs oxygen—to affect

7 The first General Board of Health in England in the epidemic in 1848 and 1849 accordingly found the evidence unanimous, that cholera was preceded by conditions of generally felt bodily depression, or by premonitory symptoms which admitted of dietetic and medical treatment, which, when combined with or preceded by measures of sanitation which reduced foul atmospheric conditions, was always effectual.

8 The composition of the following (by M. Marcet) is near that of serum without the functional oxygenation. When used, dissolve and heat the solution to  $98^{\circ} F$ .

R Chloride of Soda	...	...	...	grs. xxxi.
Phosphate	...	...	...	" v.
Carbonate	...	...	...	" vi.
Sulphate	...	...	...	" i.
Distilled Water	...	..	..	oz. x.



the lungs and stomach; acetate of lead and opium to restrain immoderate evacuations and moderate suffering; and diffusible stimulants, drinks, warmth, &c., to meet nervous depression and other indications.<sup>9</sup> All work together for the cure, for Nature is one: there is no charm.

The scientific practitioner will graduate and proportion his remedies to particular cases; and the more thorough and accurate his diagnosis under the principles laid down above, the more successful he will be in his treatment if that is also according to what has been indicated above. The appropriateness of all the varied symptoms, and the appropriateness of the varied successful remedies ignorantly and partially applied, will be perceived. I have had the most extended individual practice in this disease in the East; among the helplessly poor and weak, in seasons of epidemics; and in the most hopeless of situations, in ancient, filthy, crowded Hindoo cities, and in crowded buildings. There is of course a stage in which cure is hardly possible, and yet it may be tried. Nature has many surprises and favours for those who go right and follow her scientific truth. A caution about the after-treatment: patients who have actually got over the worst form of cholera have died the next day from the effects of a meat-broth.

To conclude;—Cholera is the result of certain internal and external conditions, as shown before, and affects all the various organs and parts; and the constitution can be helped to recover by the supply of oxygen, æration of the blood (and thus production of heat), by chloride of sodium to save the red corpuscles and the balance of all the fluids, by acetate of lead, &c., &c., as shown before;—by the graduated administration of these remedies according to the length and strength of the attack, the elements, and their various degrees, concerned in causing the disease, the powers and history of the patient, external considerations, and every other circumstance necessary.

I have done, and I can only hope that the treatment of cholera will henceforth, everywhere, be carried out—not in darkness and doubt, ignorance and error,—but on the principles expounded above by which alone we shall be able to minimize this disease. I have brought it to the “Light of Science.”

NOTE.—The late chemical researches of M. de Luua and his statement about hypoazotic gas confirm the above. See also the SEQUEL—Part II. SCARLET FEVER, its CURE; from which the following extract is here added:—

“Hence—

{ Defect of carbon or,—and,—excess of oxygen }  
 { and “ ” potash or,—and,— “ ” soda }

furnish us with all the blood and other symptoms of scarlet fever; and the cure. The equation is perfect.

“VII. Our task is over; but it is interesting to observe the *balancing* parallelism and analogy between cholera and scarlet fever, one illustrating and confirming the other. We have already shown how the cholera *formulæ* may be applied here, and we proceed to other points. In scarlet fever the temperature rises to even 112° F., the pulse is even 130, there is great surface heat, and an external eruption; in cholera the temperature goes down to even 72° F., the pulse is hardly

<sup>9</sup> Assafoetida is a good diffusible stimulant as well as antispasmodic; and strong tea may be useful as a *paratriptic* and nerve-restorative.

perceptible, there is great coolness of surface, and an internal exudation. In the one the tissues are relaxed, and the tendency is to dropsy; in the other the tissues are collapsed, and the sequel is fever. In the one excess of oxidation and deficiency of carbon; in the other deficiency of oxidation and excess of carbon. In the one the bile is emptied and lost; in the other the bile is full to congestion. In the one the juice of flesh is affected because there is deficiency of potash and excess of soda; in the other the vital fluid is affected because there is deficiency of soda and excess of potash. In the one there is destruction of albumen; in the other accession of it. In the one the hemato-fibrin solidifies through excess of oxygen and soda and defect of carbon; in the other the blood corpuscles perish through excess of carbonic acid and potash and defect of oxygen. In the one the upper air-vessels are seized; in the other the lower intestines. The one appears when ozone is excessive and carbon deficient; the other when ozone is deficient and carbon excessive. The one appears when there is a want of vegetables and fruits; the other when there is a superabundance of them. The one shows in winter or early spring; the other in summer or early autumn. The one is unknown in the sultry plains of torrid climes; The other is unknown in very cold and elevated regions. The one has its *habitat* in cold climates; the other has its *locale* in hot climates. The one in bad cases shows a skin vividly scarlet; the other in the worst cases almost dark blue. The one should be treated with chlorate of potash carbon (a vegetable diet), and coolness, etc.; the other with chloride of sodium, oxygen, warmth, etc. Both the diseases present every degree of severity between the mild and malignant forms, as even in scarlet fever sometimes the patient sinks at once and irretrievably under the virulence of the attack, and life is extinguished in a few hours. In both the fatality depends on the type of the prevailing epidemic. Both assume an epidemic existence.

"We need not to carry on the parallelism and analogy any further. It is perfect like the equation furnished above the scarlet fever, which equation also, to make the parallelism still more remarkable, may be applied for cholera with the changes implied in the parallel; thus:—

{ Defect of oxygen or,—and,—excess of carbon }  
 { and " " soda or,—and,— " " potash }

furnish us with all the blood and other symptoms of cholera; and the cure. This equation, too, is perfect.

"I have impressed the abstract sciences of logic and mathematics, and the physical sciences of chemistry, physiology, pathology, morbid anatomy, and the observation and practice of disease, to discover, by *formulæ*, and rigid rule, the truth, and to prove it; and thus, notwithstanding *lacunæ* to the unlearned, I have now brought another of the unknown and most fatal of diseases to "the Light of Science."

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